

7. Home Energy Rating Systems (HERS) Required Verification And Diagnostic Testing

7.1 California Home Energy Rating Systems

The Commission is required to regulate home energy rating system (HERS) providers in California. ~~It will soon be proposing the adoption of such regulations. When adopted, these regulations will appear in the California Code of Regulations, Title 20, Chapter 4, Article 8, Sections 1670-16756).~~ Approved HERS providers ~~are~~ will be authorized to certify raters and maintain quality control over ratings. Ratings ~~are~~ will be based on visual inspection and diagnostic testing of the physical characteristics and energy efficiency features of ~~housedwelling units~~, as constructed. When the term “dwelling unit” is used in reference to Home Energy Rating Systems (HERS) Required Verification and Diagnostic Testing applied to multifamily buildings, it shall mean each dwelling unit within each multifamily building project. When the term “building owner” is used in this Chapter, it shall mean owner of the dwelling unit.

When compliance documentation indicates field verification and diagnostic testing of specific energy efficiency ~~improvements-measures~~ as a condition for ~~those improvements to qualify for complying with~~ Title 24 ~~compliance credit~~, an approved HERS provider and certified HERS rater shall be used to conduct the field verification and diagnostic testing. HERS providers and raters shall be considered special inspectors by building departments, and shall demonstrate competence, to the satisfaction of the building official, for the visual inspections and diagnostic testing. The HERS provider and rater shall be independent entities from the builder or subcontractor installer of the energy efficiency improvements being tested and verified, and shall have no financial interest in the installation of the improvements.

7.2 HERS Required Verification and Diagnostic Testing

HERS diagnostic testing and field verification is required for ~~compliance credit~~ for:

- duct air sealing,
- ACCA Manual D design and installation,
- Refrigerant charge and airflow measurement, and
- ~~and b~~ Building envelope sealing beyond improvements covered by default assumptions,

HERS field verification is required for ~~compliance credit~~ for:

- thermostatic expansion valves,
- duct surface area reductions, and
- duct location improvements beyond those covered by default assumptions.

~~For compliance credit to be claimed for t~~These features, ~~they~~ shall be listed as *HERS Verification Required* features on the *Certificate of Compliance* (CF-1R) and the *Computer Method Summary* (C-2R). Such verification constitutes “eligibility and installation criteria” for these features. Field verified and diagnostically tested features must be described in the *Compliance Supplement*.

7.3 ~~Installation~~ Certification

When compliance ~~credit has been claimed for~~ includes duct sealing, ACCA Manual D design and installation, refrigerant charge and airflow measurement ~~and/or~~ envelope sealing, builder employees or subcontractors shall:

- complete diagnostic testing, and
- certify on the CF-6R the diagnostic test results and that the work meets the requirements for compliance credit.

For refrigerant charge and airflow measurement when the outside temperature is below 55°F, the installer shall follow the alternate charge and airflow measurement procedure described in Appendix K, Section 3. Builder employees or subcontractors using these procedures shall certify on the CF-6R that they used these procedures, the diagnostic results, that the work meets the requirements for compliance credit, and that they will return to correct refrigerant charge and airflow if the HERS rater determines at a later time when the outside temperature is above 55°F that correction is necessary.

For duct sealing completed at the rough-in stage of construction using aerosol sealant closures, builder employees or subcontractors shall:

- at rough-in, complete the fan pressurization test and certify on the CF-6R the diagnostic results,
- after installation of the interior finishing wall, verify sealing of the ducts using either the house pressure test or the pressure pan test or by visual inspection of all duct connections (including duct to air handler connections), and
- certify on the CF-6R the diagnostic results and that the work meets the requirements for compliance credit.

When compliance ~~credit has been claimed for~~ includes a thermostatic expansion valve, duct surface area reductions and duct location improvements beyond those covered by default assumptions, builder employees or subcontractors shall:

- record the feature on the CF-6R,
- record on the CF-6R the duct surface area in each duct location, and
- certify on the CF-6R that the duct surface area and locations match those on the plans, and that the work meets the requirements for compliance credit.

Installation~~er~~ certifications are required for each and every housedwelling unit.

7.4 HERS Verification Procedures

At the builder's option HERS field verification and diagnostic testing shall be completed ~~either for each housedwelling unit or for a sample of house dwelling units, of the same model. To be considered the same model, houses shall be in the same subdivision and have the same energy designs and features, including the same floor area and volume, as shown on the CF-1R except that a house may differ in its shading.~~ Dwelling units in the sample shall be in the same subdivision or multifamily housing development. Field verification and diagnostic testing for compliance credit for duct sealing shall use the diagnostic duct leakage from fan pressurization of ducts in Section 4.3.8.2.1 of Appendix F.

Field verification and diagnostic testing for compliance credit for refrigerant charge and airflow measurement shall use the standard charge and airflow measurement procedure specified in Appendix K. Field verification and diagnostic testing shall not use the alternate charge and airflow measurement procedure. Field verification and diagnostic testing shall be scheduled and completed when the outside temperature is above 55°F.

The builder shall provide the HERS provider a copy of the CF-6R containing the installation~~er~~ certifications required in Section 7.3. Prior to completing field verification and diagnostic testing, the HERS rater shall first verify that the installation~~er~~ certifications have been completed.

If the builder chooses the sampling option~~,~~ the procedures described in this section shall be followed. Sampling procedures described in this section shall be included in the *Compliance Supplement*.

7.4.1 Initial Field Verification and Testing

The HERS rater shall diagnostically test and field verify the first house dwelling unit of each model ~~as specified in Section 7.2.~~ To be considered the same model, dwelling units shall be in the same subdivision or multifamily housing development and have the same energy designs and features, including the same floor area and volume, for each dwelling unit, as shown on the CF-1R. This initial testing allows the builder to identify and correct any potential construction flaws or practices in the build out of each model. If field verification and diagnostic testing determines that the requirements for compliance are met, the HERS rater shall provide a signed and dated *Certificate of Field Verification and Diagnostic Testing (CF-4R)* to the builder and the HERS provider

7.4.2 Sample Field Verification and Testing

After the initial testing is completed, the builder shall identify a group of housedwelling units ~~of the same model~~ from which a sample will be selected for testing, and notify the HERS provider.

The group shall include only those housedwelling units expected to be ready for diagnostic testing within a maximum 180--day period.

The builder shall identify ~~these the~~ group of housedwelling units by location of County, City and either the street address or the subdivision and lot number, or the multifamily housing project name and shall identify the names and license numbers of subcontractors responsible for the duct installation, duct sealing, thermostatic expansion valve installation, refrigerant charge and airflow measurement or envelope sealing that requires diagnostic testing or field verification. The builder may add additional housedwelling units to the group during the 180 _day period by notifying the HERS provider as long as they are completed within the maximum 180-day period.

The HERS ~~provider-rater~~ shall select a minimum of one out of every seven sequentially completed housedwelling units in from the group, rounded up to the next whole number, for diagnostic testing --and field verification as described in Section 7.2.4. When several housedwelling units are ready for testing at the same time, the HERS ~~provider-rater~~ shall randomly select the housedwelling units to be tested. The HERS rater shall diagnostically test and field verify the housedwelling units selected by the HERS ~~provider-rater~~.

If field verification and diagnostic testing determines that the requirements for compliance are met, the HERS rater shall provide a signed and dated *Certificate of Field Verification and Diagnostic Testing* to the builder and the HERS provider. The *Certificate of Field Verification and Diagnostic Testing* shall report the successful diagnostic testing results and conclusions regarding compliance for the tested housedwelling unit.

~~T~~The HERS rater shall also provide a signed and dated *Certificate of Field Verification and Diagnostic Testing* to the builder and the HERS provider for up to six additional housedwelling units from the group. The *Certificate* shall not be provided for housedwelling units in which the feature requiring field verification and diagnostic testing has not been installed, sealed or completed.

The maximum 180--day period shall begin on the date of the first *Certificate of Field Verification and Diagnostic Testing* for the group and shall end either with the date of the last verified test from the group or 180 days, whichever is less. Once all homes in the group have been certified, the 180 day clock is reset. ~~The HERS provider shall determine the date the 180 day period ends, and shall notify the builder and rater.~~ HouseDwelling units within the group for which a *Certificate of Field Verification and Diagnostic Testing* has not been completed within 180 days from the date of the first *Certificate of Field Verification and Diagnostic Testing* for the group, as determined by the HERS provider, shall either be individually tested or be included in a group of housedwelling units in a subsequent sample period.

Whenever the builder changes subcontractors who are responsible for the feature that is being diagnostically field verified and tested, the builder shall notify the HERS rater of any subcontractors who have changed, and terminate sampling for the identified group. ~~The HERS rater shall cease certification. Whenever the builder changes HERS providers, the builder shall terminate sampling.~~

All ~~housedwelling units~~ using *HERS Required Verification* features for compliance that were installed by previous subcontractors or were subject to verification and testing under the supervision of a previous HERS provider, for which the builder does not have a completed *Certificate of Field Verification and Diagnostic Testing*, shall either be individually tested or included in a separate group for sampling. ~~HouseDwelling units~~ with installations completed by new subcontractors shall either be individually tested or shall be included in a new sampling group following a new *Initial Field Verification and Testing*.

The HERS ~~provider-rater~~ shall not notify the builder when sample testing will occur prior to the completion of the work that is to be tested. After the HERS ~~provider-rater~~ notifies the builder when testing will occur, the builder shall not do additional work on the features being tested.

7.4.3 Re-sampling, Full Testing and Corrective Action,

When a failure is encountered during sample testing, the HERS rater shall conduct re-sampling to assess whether that failure is unique or the rest of the ~~housedwelling units~~ are likely to have similar failings. The HERS provider shall select for re-sampling one out of every seven of all of the untested ~~housedwelling units~~ in the group ~~that have been constructed since the beginning of the 180 day time period~~, rounded up to the next whole number.

If testing in all ~~housedwelling units~~ in the re-sample confirms that the requirements for compliance credit are met, then the ~~housedwelling unit~~ with the failure shall not be considered an indication of failure in the other ~~housedwelling units~~ in the group. The builder shall take corrective action for the ~~housedwelling unit~~ with the failure, and then the HERS rater shall retest to verify compliance and issue a signed and dated *Certificate of Field Verification and Diagnostic Testing* to the builder. Sampling shall then resume for the remainder of the group.

If field verification and testing in any of the ~~housedwelling units~~ in the re-sample results in a second failure, the builder shall take corrective action in all unoccupied ~~housedwelling units~~ in the group that have not been tested but for which a *Certificate of Field Verification and Diagnostic Testing* has been completed. The HERS rater shall conduct field verification and diagnostic testing in each of these ~~housedwelling units~~ to verify that problems have been corrected and that the requirements for compliance have been met, and shall report to the HERS provider.

Builders shall offer at no charge to ~~homeowners—building owners~~ in occupied ~~housedwelling units~~ in the group to complete field verification and testing and corrective action if necessary. ~~Homeowners—Building owners~~ may decline this offer. Builders shall report the identifying location of any ~~housedwelling unit~~ in which the ~~homeowner—building owner~~ declines field verification and testing and corrective action to the HERS provider. The HERS provider shall verify that the builder has made this offer. If a ~~homeowner—building owner~~ in an occupied ~~housedwelling unit~~ declines this offer, field verification, testing and corrective action will not be required for that ~~housedwelling unit~~ and the ~~housedwelling unit~~ will no longer be considered a part of the group. If a ~~homeowner—building owner~~ accepts this offer, the builder shall take corrective action. The HERS rater shall then conduct field verification and diagnostic testing to

verify that problems have been corrected and that the requirements for compliance have been met, and shall report to the HERS provider.

The HERS provider shall file a report with the building department explaining all action taken (including field verification, testing, corrective action, offers to ~~homeowner~~homeowner building owners for testing and corrective action and ~~homeowner~~homeowner building owner declines of such offers) to bring into compliance ~~housedwelling~~housedwelling units for which a signed and dated *Certificate of Field Verification and Diagnostic Testing* has been provided to the builder. If corrective action requires work not specifically exempted by Section 112 of the UMC or Section 106 of the UBC, the builder shall obtain a permit from the building department prior to commencement of any of the work.

Until corrections, field verification and testing of all ~~housedwelling~~housedwelling units in the group have been completed or ~~homeowner~~homeowner building owners in occupied ~~housedwelling~~housedwelling units have declined corrective action, sampling of additional ~~housedwelling~~housedwelling units in the group shall cease-. If additional ~~housedwelling~~housedwelling units in the group are completed during the time required to correct, field verify and test the previously completed ~~housedwelling~~housedwelling units in the group, the rater shall individually field verify and diagnostically test those additional ~~housedwelling~~housedwelling units to confirm that the requirements for compliance credit are met. Once corrections, field verification and testing is completed for all ~~housedwelling~~housedwelling units that have a *Certificate of Field Verification and Diagnostic Testing*, excepting those where ~~homeowner~~homeowner building owners have declined corrective action, the builder shall either resume sampling for the remainder of the ~~housedwelling~~housedwelling units in the group or terminate the group.

Corrections shall not be made to a sampled ~~housedwelling~~housedwelling unit to avoid a failure. If corrections are made to a sampled ~~housedwelling~~housedwelling unit, corrections, field verification and testing shall be performed on 100% of the ~~housedwelling~~housedwelling units in the group ~~that have been constructed since the beginning of the 180 day period.~~

7.5 Responsibilities and Documentation

7.5.1 Builder

Builder employees or sub-contractors responsible for completing either diagnostic testing, visual inspection or verification as specified in Section 7.3 shall certify the diagnostic testing results and that the work meets the requirements for compliance credit on the CF-6R.

The builder shall provide the HERS provider with the identifying location of the group of ~~housedwelling~~housedwelling units to be included in the sample for field verification and diagnostic testing and the expected date that sampling may begin. The builder shall provide the HERS provider a copy of the CF-6R signed by the builder employees or sub-contractors certifying that diagnostic testing and installation meet the requirements for compliance credit.

The builder shall provide a *Certificate of Field Verification and Diagnostic Testing* signed and dated by the HERS rater to the building official in conjunction with requests for final inspection for each housedwelling unit.

When resampling reveals a failure, builders shall offer at no charge to homeownerbuilding owners in occupied housedwelling units in the group to complete field verification, testing and corrective action if necessary. HomeownerBuilding owners may decline to have field verification and testing and corrective action completed. Builders shall report the identifying location of any housedwelling unit in which the homeownerbuilding owner declines field verification and testing and corrective action to the HERS provider. Builders shall take corrective action as required in all unoccupied housedwelling units in the group and in occupied housedwelling units in the group where homeownerbuilding owners have accepted field verification, testing and corrective action.

7.5.2 HERS Provider and Rater

The HERS provider shall maintain a list of the housedwelling units in the group from which sampling is drawn, the housedwelling units selected for sampling, the housedwelling units sampled and the results of the sampling, the housedwelling units selected for re-sampling, the housedwelling units that have been tested and verified as a result of re-sampling, the corrective action taken, and copies of all *Certificates of Field Verification and Diagnostic Testing* for a period of five years.

The HERS rater providing the diagnostic testing and verification shall sign and date a *Certificate of Field Verification and Diagnostic Testing* certifying that he/she has verified that the requirements for compliance credit have been met. *Certificates of Field Verification and Diagnostic Testing* shall be provided for the tested housedwelling unit and each of up to six other housedwelling units from the group for which compliance is verified based on the results of the sample. The HERS rater shall provide this certificate to the builder and the HERS provider.

The HERS Rater shall provide a separate *Certificate of Field Verification and Diagnostic Testing* for each housedwelling unit the rater determines has met the diagnostic requirements for compliance. The HERS rater shall identify on the *Certificate of Field Verification and Diagnostic Testing* if the housedwelling unit has been tested or if it was an untested housedwelling unit approved as part of sample testing. The HERS rater shall not sign a *Certificate of Field Verification and Diagnostic Testing* for a housedwelling unit that does not have a CF-6R signed by the installer as required in Sections 7.2 and 7.5.1.

If field verification and testing on a sampled housedwelling unit identifies a failure to meet the requirements for compliance credit, the HERS rater shall report to the HERS provider and the builder that re-sampling will be required.

If re-sampling identifies another failure, the HERS rater shall report to the HERS provider and the builder that corrective action and diagnostic testing and field verification will be required for all the untested housedwelling units in the group ~~that have been constructed since the~~

~~beginning of the 180-day period.~~ This report shall specify the identifying location of all ~~housedwelling units~~ that must be corrected and fully tested.

The HERS provider shall also report to the builder once diagnostic testing and field verification has shown that the failures have been corrected in all of the ~~housedwelling units~~ except those for which the ~~homeowner~~building owner has declined field verification, testing and corrective action.

When individual ~~housedwelling unit~~ testing and verification confirms that the requirements for compliance have been met, the HERS rater shall provide a *Certificate of Field Verification and Diagnostic Testing* for each previously untested/unverified ~~housedwelling unit~~ in the group and for each additional ~~housedwelling unit~~ of the same model completed during the time required to correct, verify and test the previously untested/unverified ~~housedwelling units~~ in the group.

The HERS provider shall file a report with the building department explaining all action taken (including field verification, testing, corrective actions, offers to ~~homeowner~~building owners for testing and corrective action, and ~~homeowner~~building owner declines of such offers) to bring into compliance ~~housedwelling units~~ for which a signed and dated *Certificate of Field Verification and Diagnostic Testing* has been provided to the builder.

7.5.3 Building Department

The building department at its discretion may require independent testing and field verification in conjunction with the building department's required inspections, and/or observe the diagnostic testing and field verification performed by builder employees or subcontractors and the certified HERS rater in conjunction with the building department's required inspections to corroborate the results documented in installer certifications, and in the *Certificate of Field Verification and Diagnostic Testing*.

For ~~housedwelling units~~ that have used a compliance alternative that requires field verification and diagnostic testing, the building department shall not approve a ~~housedwelling unit~~ for occupancy until the building department has received from the builder a *Certificate of Field Verification and Diagnostic Testing* that has been signed and dated by the HERS rater.

If necessary to avoid delay of approval of dwelling units completed when outside temperatures are below 55°F, building departments may approve compliance credit for refrigerant charge and airflow measurement when installers have used the alternate charging and airflow measurement procedure described in Appendix K, Section 3. This approval will be on the condition that installers provide a signed agreement (CF-6R) to the builder with a copy to the building department to return to correct refrigerant charge and airflow if the HERS rater determines at a later time when the outside temperature is above 55°F that correction is necessary.